Information Builders

FOCUS for S/390

Millennium Interface User's Manual & Installation Guide
Version 7.0

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Preface

This manual describes how to use and install the FOCUS Millennium Interface. The Interface is included in the following FOCUS Releases:

- Release 6.8, Maintenance Level 9410 and above.
- Release 7.0, Maintenance Level 9501 and above.

To use the Interface with prior FOCUS Releases, request Technical Memo TM7919 from Information Builders Installation Support Services at (800) 736-6130 or from your local Information Builders representative.

The Interface is certified to work with Millennium Release 2 and Release 3. It supports all applications accessible through the Millennium-provided API (Application Programming Interface), such as General Ledger, Accounts Payable, and Fixed Assets.

With the FOCUS Millennium Interface installed, you can use FOCUS to analyze and report from data stored in Millennium databases. The Interface provides read-only access to the Millennium database management system (DBMS) under the MVS operating system on an MVS/XA or ESA machine. Access to the Interface in FOCUS Release 6.8 requires SET FOCSAM=NEW (the default). In Release 7.0, no FOCSAM setting is required or allowed.

To use this manual effectively, you must be familiar with basic FOCUS reporting syntax and Millennium concepts. You must also have access to Millennium database information. This includes both data within the databases, and descriptive information about them (such as database descriptions and field names). Check with your Millennium administrator about file information, storage, and other site-specific considerations.

How This Document Is Organized

- Chapter 1, *Introduction*, describes how the Interface functions and how to use it.
- Chapter 2, *Creating FOCUS Descriptions*, describes requirements for Master and Access Files.
- Chapter 3, *Getting Started*, describes how to invoke the Interface. It provides a sample CLIST and JCL.
- Chapter 4, *Reporting From Millennium Databases*, discusses reporting techniques and provides sample report requests that illustrate keyed reads, range tests, sequential reads, and joins.

- Appendix A, *Sample File Descriptions and Requests*, contains sample Master and Access Files used in the examples included throughout this manual; it also includes sample requests.
- Appendix B, *Tracing Interface Processing*, describes Interface trace facilities.
- Appendix C, *Interface Errors and Messages*, lists Interface error messages.
- Appendix D, *Millennium Release 2 Installation*, contains Interface installation instructions for Millennium Release 2.
- Appendix E, *Millennium Release 3 Installation*, contains Interface installation instructions for Millennium Release 3.

Note: If you need additional information on how to use FOCUS, consult the *FOCUS for IBM Mainframe Users Manual*.

Documentation Conventions

The following conventions are used to describe command syntax in this manual:

UPPERCASE	FOCUS commands and required keywords are presented in uppercase and must be typed as shown. (In some cases, a shorter unique truncation is acceptable.)
lowercase	User-supplied parameters are presented in lowercase.
Punctuation	Required as shown.
__	Underscore indicates a default option.
{ }	Braces enclose groups of required parameters; select one.
[ ]	Brackets enclose optional parameters; none are required.
...	Horizontal ellipses indicate a continuation of syntax.
.	Vertical ellipses indicate intervening commands for syntax.
.	
.	

Note:

- At the command level, FOCUS accepts syntax in mixed case, uppercase, or lowercase, but transmits it in uppercase.
- In sample sessions, FOCUS, Interface, Millennium DBMS, or system responses are presented in uppercase; user responses are presented in lowercase.

Index Conventions

Please note the following conventions used throughout the index:

- Special character entries are listed first, followed by the remaining index entries in alphabetical order.
- These standard abbreviations apply:
  - AFD for Access File.
  - IVP for Installation Verification Program.
  - MFD for Master File.
  - MSO for Multi-Session Option.
  - PTF for program temporary fix.
- Commands appear in uppercase.

Related Publications

Related publications include:

- *FOCUS for IBM Mainframe Users Manual Release 7.0* (DN1000983.0495).
- *FOCUS for IBM Mainframe Multi-Session Option Installation and Technical Reference Guide Release 7.0* (DN1000966.1095).
- *FOCUS for IBM Mainframe MVS/TSO Installation Guide Release 7.0* (DN1000994.0896).
- *FOCUS COBOL FD Translator Users Manual Release 2.0* (DN1000023.0194).

Note: The title and Document Number (DN) information provided here are accurate as of this printing. To ensure up-to-date information when ordering, please consult the latest *Information Builders Publications Catalog*.

User Feedback

In an effort to produce effective documentation, the Documentation Services staff at Information Builders welcomes any opinion you can offer regarding this manual. Please use the Reader Comments form at the end of this manual to relay suggestions for improving the publication or to alert us to corrections. Thank you, in advance, for your comments.

Customer Support

Questions about FOCUS, FOCUS products, or EDA?

Call Information Builders Customer Support Service (CSS) at (800)736-6130. Customer service representatives are available between 8:00 a.m. and 8:00 p.m. EST to address all your FOCUS and EDA questions.

To help our consultants answer your queries most effectively, please be ready to provide the following information when you call:

- Your six digit site code number (xxxx.xx).
- The FOCEXEC procedure (preferably with line numbers).
- Master File with picture (provided by CHECK FILE).
- Run sheet (beginning at login, including call to FOCUS), containing:
  - ? RELEASE
  - ? FDT
  - ? LET
  - ? LOAD
  - ? COMBINE
  - ? JOIN
  - ? DEFINE
  - ? STAT
  - ? SET or ? SET GRAPH
  - ? USE
  - ? MVS DDNAME
- The exact nature of the problem. For example, are the results or is the format incorrect? Does an abend occur? Are the text or calculations missing or misplaced? Is this related to any other problem?
- Has the procedure ever worked in its present form? Has it been changed recently?
- What release of the operating system are you using? Has it, FOCUS, or an interface system changed?
- Is this problem reproducible?

Information Builders consultants can also give you general guidance on FOCUS capabilities and documentation.

You can also FAX your questions to CSS at (212) 564-1881, or upload them to the FOCWIZARD or FOCSERVICES forums on Compuserve.

1 Introduction

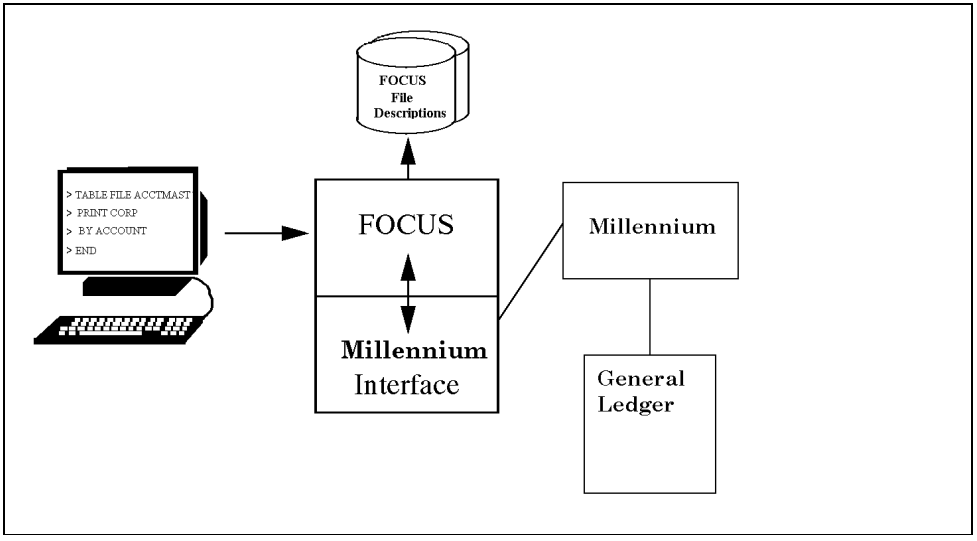
The FOCUS Millennium Interface enables FOCUS to access Millennium databases. FOCUS is well adapted to the Millennium environment and fully supports its data model.

Users with any level of expertise, from beginners to advanced data processing professionals, can take advantage of the data retrieval and analysis facilities of the Interface. These include easy-to-use, menu-driven query tools and a powerful reporting language that can satisfy virtually any requirement. All facilities are tightly integrated for transparent access to the underlying data file. Once you describe the Millennium data structures to FOCUS , you can issue report requests without being concerned about the details of the files, navigational techniques for retrieval, or subroutines written in conventional programming languages.

The Interface provides read-only access to existing Millennium databases; as a result, FOCUS features that perform write operations, such as MODIFY and FSCAN, are not supported. The Interface uses standard Millennium read-only calls; it never jeopardizes the integrity of a Millennium database. FOCUS DBA security features permit controlled data access at the user, file, field, or field-value levels.

When you issue a retrieval request, the Interface translates it into an equivalent set of Millennium calls. The data returned by the Millennium DBMS in response is then passed to the FOCUS Report Writer. The Report Writer can process data from any FOCUS -readable file. The Interface does not recreate the data as a FOCUS database.

The following diagram depicts report processing:



The Interface creates optimized calls based on request criteria. Thus, the two primary tasks the Interface performs are:

- Issuing retrieval instructions to obtain data from Millennium databases.
- Establishing retrieval procedures that make efficient use of the available retrieval techniques.

Just as important, the Interface initiates and monitors communication between itself and the Millennium DBMS and provides descriptive error messages when necessary.

FOCUS and the Millennium DBMS interact as follows:

1. Given a report request, the Interface builds calls that define the request in terms the Millennium DBMS can understand.
2. Having received these calls from the Interface, the Millennium DBMS retrieves data targeted by the request and returns it to FOCUS.
3. The Millennium DBMS sends records one at a time and/or a return code back to the Interface, which in turn passes it to FOCUS for further processing.

1.1 Environments

The Interface operates in conjunction with FOCUS to access the Millennium DBMS under the MVS/XA and MVS/ESA operating systems in the TSO, MVS batch, and FOCUS Multi-Session Option (MSO) environments..

The Interface is compatible with Millennium Release 2 and Release 3. It supports Multi:Mill and compacted files.

1.2 Ease of Use

With the Interface installed, you use the FOCUS language to request access to Millennium databases. There is no need for specialized subroutines or embedded commands.

To make a Millennium file intelligible to FOCUS, describe it once in FOCUS terminology by creating a Master File. This description makes it possible to refer to the individual fields of the Millennium database via the FOCUS fieldname.

In fact, once there are Master Files for Millennium databases, you can use all FOCUS reporting facilities such as the Report Writer, graphics, statistics, and FOCCALC to access the data. You can also use the FOCUS Dialogue Manager facility to create prompt-driven procedures for reporting from Millennium databases. There is no need to use conventional computer languages like COBOL.

Database administrators (DBAs) often create Master Files; therefore, they may already be available at your site.

If you need to create a Master File, and your site has a COBOL copy book that describes the Millennium data, you may be able to use the COBOL FD Translator to help create the Master File. For more information, consult the *FOCUS COBOL FD Translator Users Manual*.

1.3 Efficiency

When you issue a report request, the Interface analyzes the requirements specified in the request and sets up procedures to efficiently locate and retrieve the data records that fulfill those requirements. Depending on the requirements in the request, the Interface automatically generates optimized calls.

The Interface retrieves from the Millennium DBMS only those records corresponding to the key fields referenced in the report request. Additionally, the Interface may instruct the Millennium DBMS to apply the record selection criteria specified in the request, freeing FOCUS from this task. FOCUS can then join, sort, and aggregate the data if necessary. This reduction in the volume of DBMS-to-FOCUS communication decreases response times for Interface users.

1.4 Security

All operating system security features or restrictions that are in effect apply to the Interface.

FOCUS also provides its own security facilities that you may use to complement existing security. For example, you can encrypt Master Files that contain security information. FOCUS security can enforce the following levels of restriction:

- File-level security to prevent access to a Millennium database.
- Field-level security to limit the fields within a Millennium database that are accessible to a user.
- Field-value security to limit the fields within a Millennium database that are accessible to a user based on a specified field's values.

Refer to the *FOCUS for IBM Mainframe Users Manual* for information about DBA security.

2 Creating FOCUS Descriptions

This chapter explains the rules for making a Millennium database accessible to FOCUS. In order to access a Millennium database using FOCUS, one of the requirements is a Master File. The Master File describes the Millennium file to FOCUS. Master Files are stored as members of an MVS partitioned dataset (PDS).

For each Master File, FOCUS must access the appropriate Millennium database ID (DBID). There are two methods for assigning the DBID to a Master File (see Section 2.2, *Specifying the Millennium DBID and TRANID*). Depending on your assignment method and on your Millennium lead transaction ID, you may need an Access File in addition to the Master File:

- Master Files describe the fields in Millennium files (see Section 2.1, Master Files). Master Files for Millennium files are the same as Master Files for VSAM files, except that the SUFFIX value for a Millennium file must be CPMILL or CPMILL2 for Millennium Release 2 or CPMILL3 for Millennium Release 3. The *FOCUS for IBM Mainframe Users Manual* describes VSAM Master Files.

  The Master File must conform to the COBOL copybook for the file. If your site has the FOCUS COBOL FD Translator installed, you can use it to help create a Master File. You can then edit this Master File (to change the SUFFIX value) with any text editor, including the FOCUS editor, TED.

- Access Files enable you to use a lead transaction ID (TRANID) other than the default that your site established during installation (see Section 2.2, *Specifying the Millennium DBID and TRANID*). An Access File can also assign the DBID for its corresponding Master File.

When you issue a report request such as TABLE FILE ACCTMAST, FOCUS processes the request with the following steps:

1. It locates the Master File named ACCTMAST.
2. It examines the SUFFIX attribute in the Master File. Each Master File that describes a Millennium database must include the attribute SUFFIX=CPMILL or SUFFIX=CPMILL2 for Millennium Release 2 or SUFFIX=CPMILL3 for Millennium Release 3. When FOCUS detects this SUFFIX, it passes control to the Interface.
3. It examines the Master File member name. If an Access File PDS has been allocated, and if it has a member with the same name as the Master File (ACCTMAST in this example), the Interface locates that Access File.

   The Interface uses the information contained in both the Master File and the Access File (if there is one) to generate the Millennium calls required by the report request. It passes these calls to Millennium.
4. The Interface retrieves the data generated by the Millennium DBMS and returns control to FOCUS. For some requests, FOCUS may perform additional processing on the returned data.

2.1 Master Files

Master Files for Millennium files follow the same rules as Master Files for VSAM files, except for the SUFFIX attribute (the SUFFIX value for a Millennium file must be CPMILL or CPMILL2 for Millennium Release 2 or CPMILL3 for Millennium Release 3). This section provides an annotated example that illustrates the main features of a Master File.

For a complete discussion of Master Files, refer to the *FOCUS for IBM Mainframe Users Manual*.

2.1.1 Sample Master File

The following partial Master File illustrates how to describe a Millennium file. The numbers to the left refer to the explanatory notes that follow the sample:

```
1.  FILENAME=ACCTMAST,    SUFFIX = { CPMILL  }  [,$]
                                   { CPMILL2 }
                                   { CPMILL3 }
2.  SEGNAME=ROOT,SEGTYPE=S0,$
3.  FIELDNAME=DELETE_FLAG   ,ALIAS=      ,USAGE=A1      ,ACTUAL=A1     ,$
4.  GROUP=CONTRL_KEY        ,ALIAS=KEY   ,USAGE=A23     ,ACTUAL=A23    ,$
     FIELDNAME=CORP         ,ALIAS=      ,USAGE=A3      ,ACTUAL=A3     ,$
     FIELDNAME=ACCOUNT      ,ALIAS=      ,USAGE=A10     ,ACTUAL=A10    ,$
     FIELDNAME=COST_CENTR   ,ALIAS=      ,USAGE=A10     ,ACTUAL=A10    ,$
    FIELDNAME=LRECL         ,ALIAS=      ,USAGE=P4      ,ACTUAL=P3     ,$
    FIELDNAME=ACCT_TYPE     ,ALIAS=      ,USAGE=A1      ,ACTUAL=A1     ,$
    FIELDNAME=ACCT_DESC     ,ALIAS=      ,USAGE=A35     ,ACTUAL=A35    ,$
    FIELDNAME=FILLER        ,ALIAS=      ,USAGE=A54     ,ACTUAL=A54    ,$
    FIELDNAME=SLID          ,ALIAS=      ,USAGE=A1      ,ACTUAL=A1     ,$
    FIELDNAME=FILLER        ,ALIAS=      ,USAGE=A25     ,ACTUAL=A25    ,$
    FIELDNAME=REPORT_KEY    ,ALIAS=      ,USAGE=A90     ,ACTUAL=A90    ,$
    FIELDNAME=FILLER        ,ALIAS=      ,USAGE=A80     ,ACTUAL=A80    ,$
    FIELDNAME=ACT_IND_3YR   ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=ACT_IND_2YR   ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=ACT_IND_LYR   ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=ACT_IND_CYR   ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=B1_IND        ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=B2_IND        ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=B3_IND        ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=B4_IND        ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=B5_IND        ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=B6_IND        ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=AVG_IND_3YR   ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=AVG_IND_2YR   ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=AVG_IND_LYR   ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=AVG_IND_CYR   ,ALIAS=      ,USAGE=I1      ,ACTUAL=A1     ,$
    FIELDNAME=CUR_BAL       ,ALIAS=      ,USAGE=P15.2   ,ACTUAL=P8     ,$
    FIELDNAME=FILLER        ,ALIAS=      ,USAGE=A64     ,ACTUAL=A64    ,$
    FIELDNAME=BATCH_BAL     ,ALIAS=      ,USAGE=A15.2   ,ACTUAL=P8     ,$
    .
    .
    .
```

Note:

1. Each Master File begins with a file declaration that names the file and describes the type of data source—a Millennium file in this case. The file declaration has two attributes, FILENAME and SUFFIX.

   The FILENAME can be any one- to eight-character name that complies with FOCUS naming conventions. For documentation purposes, you can give it the same name as the Master File member name.

   SUFFIX=CPMILL or SUFFIX=CPMILL2 indicates that Millennium Release 2 is required for data retrieval.

   SUFFIX=CPMILL3 indicates that Millennium Release 3 is required for data retrieval.

2. Each type of Millennium record described in a Master File requires a segment declaration consisting of at least two attributes, SEGNAME and SEGTYPE. The SEGNAME value is ROOT, and the SEGTYPE value is S0 (S zero). Refer to the *FOCUS for IBM Mainframe Users Manual* for a discussion of other SEGNAME values and additional segment attributes (such as PARENT).

3. To describe a Millennium field in the Master File, you must include a FIELD record (or, for a key field, a GROUP record) that specifies the attributes FIELDNAME, ALIAS, USAGE, and ACTUAL:

   - The FIELDNAME value is the FOCUS name for the field.

     Since fieldnames appear as default column titles on reports, select names that are representative of the data. You can specify fieldnames, aliases, or a unique truncation of either in requests. For a complete discussion of FOCUS fieldnames, see the *FOCUS for IBM Mainframe Users Manual*.

   - The ALIAS value in the Master File is an optional alternate name for the field, except if the field is a key field. Key fields are discussed in item 4.

   - The USAGE format describes how FOCUS will display the value in reports.

   - The ACTUAL format describes how the data field exists in storage. It must conform to the COBOL FD statement for the field. See the next section for a chart that illustrates how to determine ACTUAL formats.

   The *FOCUS for IBM Mainframe Users Manual* explains additional attributes, such as TITLE and DESCRIPTION, and how to define temporary fields in the Master File.

4. You must describe the primary key field with the GROUP attribute instead of the FIELDNAME attribute, and you must assign its alias as ALIAS=KEY.

   If the key field is composed of multiple elementary fields, describe the elementary fields directly below the GROUP record. The USAGE format of the GROUP must be alphanumeric; its length is the sum of the FOCUS internal storage lengths for the individual fields. The ACTUAL format of the GROUP must also be alphanumeric; its length is the sum of the subordinate field lengths.

ACTUAL Format Conversion Chart

The ACTUAL attribute indicates the FOCUS representation of Millennium field formats. Use the following chart as a guide for describing ACTUAL field formats:

COBOL FORMAT	COBOL PICTURE	FOCUS INTERNAL STORAGE	ACTUAL FORMAT	USAGE FORMAT
DISPLAY	X(4)	4	A4	A4
DISPLAY	S99	2	Z2	P3
DISPLAY	9(5)V9	6	Z6.1	P8.1
DISPLAY	99	2	A2	A2
COMP	S9	4	I2	I2
COMP	S9(4)	4	I2	I4
COMP	S9(5)	4	I4	I5
COMP	S9(9)	4	I4	I9
COMP-1	—	4	F4	F6
COMP-2	—	8	D8	D15
COMP-3	9	8	P1	P1
COMP-3	S9V99	8	P2	P5.2
COMP-3	9(4)V9(3)	8	P4	P8.3

Note: The USAGE lengths shown are minimum values. You can make them larger and add edit options. You must allow space for all possible digits, a minus sign for negative numbers, and a decimal point in numbers with decimal digits.

2.2 Specifying the Millennium DBID and TRANID

You must assign a Millennium database ID (DBID) to each Master File. You can use either of the following techniques to assign the DBID:

- Include the DBID as the last three characters of the Master File member name. For example, if you store the Master File in member ANYGLM, its assigned DBID is GLM (General Ledger).
- Assign the DBID in an Access File. The Access File can also assign the lead transaction ID (TRANID) for its associated Master File.

Create an Access File if:

- The Master File member name does not include a DBID assignment; that is, the last three characters of the Master File member name do not identify a valid DBID.
- The Master File member name assigns a DBID, but the DBID it assigns is not the one you need to access.
- You need a lead transaction ID other than the default. (Your site establishes the default lead transaction ID during installation, as described in Appendix D, *Millennium Release 2 Installation*, and Appendix E, *Millennium Release 3 Installation* .)

The Master File member name must either include the appropriate DBID assignment, or it must identify an Access File, or both.

The syntax for the Master File member name is

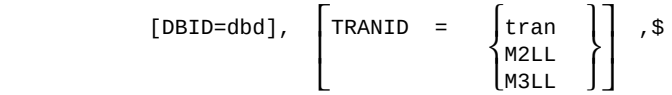
```
{xxxxxdbd}
{anyname }
```

where:

`xxxxx`	Are up to five characters that conform to MVS file-naming conventions.
`dbd`	Is a three-character DBID. FOCUS accesses this DBID unless an Access File member named xxxxxdbd exists and assigns a different DBID. When both the Master File member name and the Access File assign the DBID, the DBID from the Access File takes precedence.
`anyname`	Is the name of a member in the Access File dataset that contains the DBID and/or lead transaction ID to use.

As an example, consider the Master File in Section 2.1, Master Files. It is member ACCTMAST in the Master File PDS, indicating that member ACCTMAST in the Access File dataset contains the required DBID and/or TRANID.

The syntax in an Access File is



where:

`dbd`	Is the three-character Millennium DBID associated with this file. You can omit this parameter if you included the appropriate DBID as the last three characters of the Master File member name.
`tran`	Is the optional Multi:Mill lead transaction ID. The default lead transaction ID is M2LL for Millennium Release 2 or M3LL for Millennium Release 3 unless your site chooses a different default value during installation, as described in Appendix D, *Millennium Release 2 Installation*, and Appendix E, *Millennium Release 3 Installation.* Check with your systems support staff. **Note:** Every Master File named in a single request (such as a join of two databases) must use the same TRANID.

The following is a sample Access File:

```
DBID=GLM,$
```

This Access File points to:

- A General Ledger file (DBID=GLM).
- The default lead transaction ID, M2LL for Millennium Release 2 or M3LL for Millennium Release 3 (unless the site chose a different default during installation).

2.3 Allocating File Descriptions

To invoke the Interface, you execute a CLIST or submit JCL that allocates all FOCUS and Interface datasets and executes FOCUS. Chapter 3, *Getting Started*, provides a sample CLIST and sample JCL.

Master Files are stored in an MVS partitioned dataset (PDS) allocated to ddname MASTER. Each Master File is a member in this dataset; the ACCTMAST Master File is member ACCTMAST.

Access Files are stored in an MVS PDS allocated to ddname FOCPRV. The member name of an Access File within its PDS must be identical to the member name of the corresponding Master File within *its* PDS. If you access only the default TRANID, and if you establish all DBID assignments via Master File member names, you can omit the Access File allocation.

Refer to Chapter 3, *Getting Started*, for examples of these allocations.

3 Getting Started

This chapter explains how to invoke the Interface:

- Interactively, by executing a CLIST from TSO. See Section 3.1, *Interactive Access From TSO*.
- In batch, by submitting JCL. See Section 3.2, *Batch Access*.
- With considerations for MSO. See Section 3.3, *MSO Considerations*.

Note: Please check with your systems support staff for MVS high-level qualifiers and other site-specific information.

3.1 Interactive Access From TSO

To run FOCUS interactively, you invoke a CLIST or REXX EXEC from TSO that allocates all FOCUS and Interface datasets and calls FOCUS.

You can allocate the FOCUS and Interface load libraries (taken from the same FOCUS release and maintenance level) directly in your CLIST or REXX EXEC, or your site may choose to allocate them to ddname STEPLIB in your TSO logon procedure. (The *FOCUS for IBM Mainframe MVS/TSO Installation Guide* discusses the FOCUS CLIST in detail.)

If the FOCUS load libraries are not allocated in your TSO logon procedure, use the following CLIST after editing it to conform to your site's standards. The numbers on the left refer to the explanatory notes that follow the sample CLIST

```
1.  ALLOC FI(Mx0000)     DA('millen.ctrlfile.Mx0000') SHR REU
    ALLOC FI(Mx0002)     DA('millen.ctrlfile.Mx0002') SHR REU
2.  ALLOC FI(database)   DA('millen.database') SHR REU
3.  ALLOC FI(MASTER)     DA(prefix.MASTER.DATA) SHR REU
4.  ALLOC FI(FOCEXEC)    DA(prefix.FOCEXEC.DATA) SHR REU
5.  ALLOC FI(ERRORS)     DA(prefix.ERRORS.DATA) SHR REU
6.  ALLOC FI(FOCPRV)     DA(prefix.FOCPRV.DATA) SHR REU
7.  ALLOC FI(FOCLIB)     DA(prefix.FOCLIB.LOAD) SHR REU
8.  ALLOC FI(USERLIB)    DA(prefix.FUSELIB.LOAD) SHR REU
9.  ALLOC FI(GPTRACE)    DA(*)
    CALL 'prefix.FOCLIB.LOAD(FOCUS)'
```

where:

`x`	Is 2 for Millennium Release 2 or 3 for Millennium Release 3.
`prefix`	Is the high level qualifier for your site's FOCUS production datasets.
`millen`	Is the high level qualifier for your site's Millennium production datasets.
`database`	Is the ddname required by Millennium for a Millennium database. If you access more than one Millennium database, you need to allocate more than one ddname, each determined by the options chosen when your site installed Millennium.

1. Allocate the following ddnames to your site's Millennium Control File datasets:
   - M20000 and M20002 if you are running Millennium Release 2.
   - M30000 and M30002 if you are running Millennium Release 3.
2. Your site's Millennium installation options determine the ddnames for the Millennium databases. See your Millennium documentation or your Millennium administrator.
3. Allocate ddname MASTER to the dataset that contains Master Files.
4. Allocate ddname FOCEXEC to the dataset that contains FOCUS procedures (FOCEXECs).
5. Allocate ddname ERRORS to the dataset that contains FOCUS messages.
6. Optionally, allocate ddname FOCPRV to the dataset that contains Access Files. You can omit the allocation for ddname FOCPRV if all database IDs are assigned via the Master File member name (see Chapter 2, *Creating FOCUS Descriptions*), and if you always access your site's default lead transaction ID (see Appendix D, *Millennium Release 2 Installation*, or Appendix E, *Millennium Release 3 Installation*).
7. Allocate ddname FOCLIB to the dataset that contains the FOCUS and Interface load modules.
8. Allocate ddname USERLIB to the dataset that contains user-written subroutines.
9. Optionally, allocate ddname GPTRACE if you want to trace the calls that the Interface makes to Millennium (see Appendix B, *Tracing Interface Processing*).

Your system support staff can give you proper dataset names for your site. You can also allocate the FOCUS and Interface load libraries in your TSO logon procedure, in which case you should remove them from the CLIST. The Millennium API modules must be MVS-loadable.

3.2 Batch Access

To invoke the Interface in batch mode, submit JCL that allocates the FOCUS and Interface libraries and executes FOCUS. You can use the following JCL as a model after editing it to conform to your site's standards and adding a JOB card. The numbers on the left refer to the explanatory notes that follow the sample JCL

```
   //job card goes here
   //BATCHJOB EXEC PGM=FOCUS,REGION=nn
1. //STEPLIB  DD DISP=SHR,DSN=millen.loadlib
   //         DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
   //* MILLENNIUM ALLOCATIONS
2. //Mx0000   DD DISP=SHR,DSN=millen.ctrlfile.Mx0000
   //Mx0002   DD DISP=SHR,DSN=millen ctrlfile.Mx0002
3. //database DD DISP=SHR,DSN=millen.database
   //* FOCUS ALLOCATIONS
   //USERLIB  DD DISP=SHR,DSN=prefix.FUSELIB.LOAD
4. //MASTER   DD DISP=SHR,DSN=prefix.MASTER.DATA
5. //FOCEXEC  DD DISP=SHR,DSN=prefix.FOCEXEC.DATA
6. //ERRORS   DD DISP=SHR,DSN=prefix.ERRORS.DATA
7. //FOCPRV   DD DISP=SHR,DSN=prefix.FOCPRV.DATA
8. //GPTRACE  DD SYSOUT=*
   //SYSPRINT DD SYSOUT=*
   //SYSIN    DD *
9. TABLE FILE ACCTMAST
      .
      .
      .
   END
   FIN
```

where:

`nn`	Is the region size.
`millen`	Is the high level qualifier for your site's Millennium production datasets.
`loadlib`	Is your site's Millennium load library.
`prefix`	Is the high level qualifier for your site's FOCUS production datasets.
`x`	Is 2 for Millennium Release 2 or 3 for Millennium Release 3.
`ctrlfile`	Is the Millennium control file.
`database`	Is the ddname required by Millennium for a Millennium database. If you access more than one Millennium database, you need to allocate more than one ddname, each determined by the options chosen when your site installed Millennium.

1. Concatenate the Millennium API modules for the Interface to ddname STEPLIB unless they are already available to the job via linklist or LPA.
2. Allocate the following ddnames to your site's Millennium Control File datasets:
   - M20000 and M20002 if you are running Millennium Release 2.
   - M30000 and M30002 if you are running Millennium Release 3.
3. Your site's Millennium installation options determine the ddnames for the Millennium databases. See your Millennium documentation or your Millennium administrator.
4. Allocate ddname MASTER to the dataset that contains Master Files.
5. Allocate ddname FOCEXEC to the dataset that contains FOCUS procedures (FOCEXECs).
6. Allocate ddname ERRORS to the dataset that contains FOCUS messages.
7. Optionally, allocate ddname FOCPRV to the dataset that contains Access Files. You can omit the allocation for ddname FOCPRV if all database IDs are assigned via the Master File member name (see Chapter 2, *Creating FOCUS Descriptions*), and if you always access your site's default lead transaction ID (see Appendix D, *Millennium Release 2 Installation*, or Appendix E, *Millennium Release 3 Installation*).
8. Optionally, allocate ddname GPTRACE if you want to trace the calls that the Interface makes to Millennium (see Appendix B, *Tracing Interface Processing*).
9. You must allocate your FOCUS request to ddname SYSIN. The END statement indicates the end of the request. FIN terminates FOCUS.

Your system support staff can give you proper JOB card specifications and dataset names for your site.

The file allocations in batch are similar to those in the CLIST, with a few changes. You must allocate your FOCUS request to ddname SYSIN. The FOCUS request is coded in-stream in the sample JCL, but you can store it in a dataset if you prefer. Output is written to the file or SYSOUT class allocated to ddname SYSPRINT.

For additional information of FOCUS and batch processing, refer to the *FOCUS for IBM Mainframe Users Manual.*

3.3 MSO Considerations

The MSO server must allocate all Millennium control and database ddnames globally because Millennium software is unaware of any MSO ddname translations that are in effect. Consult the *FOCUS for IBM Mainframe Multi-Session Option Installation and Technical Reference Guide* for complete instructions.

4 Reporting From Millennium Databases

This chapter explains how the Interface handles report generation. It includes the following topics:

- Interface optimization (see Section 4.1, *Interface Optimization*).
- Examples of record selection tests (see Section 4.2, *Record Selection Examples*).

Note: See the *FOCUS for IBM Users Manual* for complete information about data retrieval.

You can use all FOCUS reporting facilities, such as TABLE and TABLEF, to retrieve data from Millennium databases. FOCUS Release 6.8 requires SET FOCSAM = NEW (the default). In Release 7.0, no FOCSAM setting is required or allowed.

This chapter includes sample report requests. Refer to Appendix A, *Sample File Descriptions and Requests,* for file descriptions of the databases referenced in these examples.

4.1 Interface Optimization

When you issue a report request, the Interface must determine how much of the request it can pass off to Millennium. If Millennium can apply the screening conditions and select the proper records from the database, FOCUS need only format the results. However, if Millennium cannot apply the screening conditions from the FOCUS request, the Interface must retrieve the records sequentially from Millennium and let FOCUS apply the screening criteria.

Optimization is the process by which the Interface passes the selection operations of a FOCUS request to Millennium for processing. Interface optimization reduces the volume of Millennium-to-FOCUS communication; it improves response time by exploiting Millennium internal optimization techniques.

The most efficient way to retrieve selected records from a Millennium file is by applying a screening test against its primary key. This type of test enables Millennium to find the required records directly through the file's index rather than by a sequential search of the file. The Interface supports keyed reads against a primary key.

Although you can issue any FOCUS report request through the Interface, keep in mind that:

- Selection criteria based on the entire primary key or on a subset of the primary key may take advantage of direct reads using the index. If the FOCUS request includes selection criteria on fields that are not key fields, the Interface retrieves the necessary data sequentially, and FOCUS screens them.
- The Interface supports indexed reads for a selection test that references a DEFINE (temporary) field if the full or partial key is embedded in the DEFINE field.
- Selection criteria that use the EQ and IS relations against the full primary key have the greatest potential for performance improvement over sequential reads. In tests on a partial key, these relations retrieve only the first instance of the screening value.
- Selection tests that use the relations GE, FROM, FROM-TO, GT, EXCEEDS, IS-MORE-THAN, and NOT-FROM-TO against a key field may achieve some improvement in performance from keyed reads. Since Millennium stores records in ascending key sequence, a direct read can establish the correct starting point for subsequent sequential reads that retrieve the remaining records in the range. In the following example, the Interface requests that Millennium use the index to find the record containing the primary key value 66:

  ```
  IF keyfield GE 66
  ```

  It then retrieves the remaining records sequentially.
- Selection criteria that use the relations NE, IS-NOT, CONTAINS, OMITS, LT, IS-LESS-THAN, LE, and NOT-FROM cannot take advantage of direct reads. These selection criteria are still applied, by FOCUS, through sequential retrieval.

4.2 Record Selection Examples

You can issue any FOCUS report request through the Interface. However, requests whose record selection criteria are applied by Millennium through direct reads result in far fewer calls and I/O operations.

This section includes sample requests and explains whether they are optimized.

4.2.1 Keyed Read Example

In this example, the selection test references the primary key. Therefore, the Interface passes the key information to the Millennium API:

```
TABLE FILE GL001IVP
PRINT KEY ACCT_DESC
IF KEY GT 170A1000000000000000000
END
```

If you allocate GPTRACE before running this request, the code OPT G in the trace indicates when the GT (greater than) condition is processed. See Appendix B, *Tracing Interface Processing*, for a discussion and example of GPTRACE. The resulting report follows:

```
NUMBER OF RECORDS IN TABLE=       17  LINES=     17

PAGE     1


CONTRL_KEY                ACCT_DESC
----------                ---------
170A11200040 1041620      CUSTOMER A/R-LOCAL
170A11200040 1758030      CUSTOMER A/R-LOCAL
170A11200040 1758230      CUSTOMER A/R-LOCAL
170A11200040 1758240      CUSTOMER A/R-LOCAL
170A11200040 1759020      CUSTOMER A/R-INT
170A11200050 1041620      CUSTOMER A/R-LOCAL
170A11200050 1759020      CUSTOMER A/R-LOCAL
170A12120010 1041620      CUSTOMER A/R-LOCAL
170A12120010 1758220      CUSTOMER A/R-INT
170A12120010 1759020      CUSTOMER A/R-LOCAL
170A12220020 1758030      CUSTOMER A/R-LOCAL
170A12220020 1758230      CUSTOMER A/R-LOCAL
170A12220020 1759020      CUSTOMER A/R-INT
170A12240200 1041620      CUSTOMER A/R-LOCAL
170A12240200 1758240      CUSTOMER A/R-LOCAL
170A12240200 1759020      CUSTOMER A/R-INT
170A12240990 1759020      CUSTOMER A/R-FOR
```

4.2.2 Keyed Range Example

This request includes a range condition on the primary key. The Interface passes the key information to the Millennium API:

```
TABLE FILE GL001IVP
PRINT KEY ACCT_DESC
IF KEY GT 170A1000000000000000000
IF KEY LT 170A1200000000000000000
END
```

If you allocate GPTRACE before running this request, the code OPT G in the trace indicates when the range condition (GT and LT) is processed. See Appendix B, *Tracing Interface Processing*, for a discussion and example of GPTRACE. The resulting report follows:

```
NUMBER OF RECORDS IN TABLE=        7  LINES=      7

PAGE     1


CONTRL_KEY                ACCT_DESC
----------                ---------
170A11200040 1041620      CUSTOMER A/R-LOCAL
170A11200040 1758030      CUSTOMER A/R-LOCAL
170A11200040 1758230      CUSTOMER A/R-LOCAL
170A11200040 1758240      CUSTOMER A/R-LOCAL
170A11200040 1759020      CUSTOMER A/R-INT
170A11200050 1041620      CUSTOMER A/R-LOCAL
170A11200050 1759020      CUSTOMER A/R-LOCAL
```

4.2.3 Sequential Read Example

The next request has no selection criteria. Therefore, the Interface retrieves each record sequentially:

```
TABLE FILE GL002IVP
PRINT KEY ACCT_OWNER
END
```

If you allocate GPTRACE before running this request, the code OPT S appears in the trace for each record retrieved. See Appendix B, *Tracing Interface Processing*, for a discussion and example of GPTRACE. The resulting report follows:

```
PAGE     1


CONTRL_KEY                ACCT_OWNER
----------                ----------
170A00100000 1758240 00   BANKO AMERICA
170A00400010 1041620 00   BANKO AMERICA
170A00500010 1758030 00   BANKO AMERICA
170A00501180 1041620 00   FIRST COMERCIAL
170A00501180 1758030 00   UNITED TRUST
170A00501180 1758220 00   FIRST STATE
170A00501180 1758230 00   STATE TRUST
170A00501180 1759020 00   COUNTY FEDERAL
170A11200040 1041620 01   BEST CHOICE
170A11200040 1758030 01   EVERYDAY
170A11200040 1758230 01   HARD-2-BEAT
170A11200040 1758240 01   INTER CO-OP
170A11200040 1759020 01   INTER CO-OP
170A11200050 1041620 01   READY STEADY
170A11200050 1759020 01   ALWAYS THERE
170A12120010 1041620 01   PARTNERS-4-LIFE
170A12120010 1758220 01   PARTNERS-4-LIFE
170A12120010 1759020 01   NEVER STOP
170A12220020 1758030 01   FIRST FINEST
170A12220020 1758230 01   OVERTHERE
170A12220020 1759020 01   OVERTHERE
170A12240200 1041620 01   MA-N-PA
170A12240200 1758240 01   ACME MULTI
170A12240200 1759020 01   ACME MULTI
170A12240990 1759020 01   ACME MULTI
```

4.2.4 Dynamic JOIN Example

With the FOCUS dynamic JOIN command, you can reference two or more related databases or external files in a single report request. The databases remain physically separate, but FOCUS treats them as a single logical structure.

The JOIN command joins a host file (the FROM file) to a cross-referenced file (the TO file) at execution time by matching values in a field common to both files. Millennium databases can participate as host or cross-referenced files in join operations.

To issue a join, you do not have to restructure the Millennium database. You can join a Millennium database to other Millennium databases or, with the appropriate FOCUS Interfaces installed, you can join a Millennium database to any other joinable database such as a DB2 table, a VSAM file, or a FOCUS database.

Two types of dynamic join are available. The difference between the two depends on the cross-referenced file and its key values.

- The multiple or non-unique join defines a one-to-many or many-to-many correlation between the records of the host file and the records of the cross-referenced file. For each record in the host file, FOCUS may retrieve multiple matching records from the cross-referenced file.
- The unique join defines a one-to-one correlation between a record in the host file and one record in the cross-referenced file. For each record in the host file, FOCUS retrieves at most one matching record from the cross-referenced file.

When a Millennium database is the cross-referenced (TO) file:

- If the join is unique, the join field must be the full primary key.
- If the join is non-unique, the join field must be an initial subset of the primary key (that is, the first fields in the GROUP field description). In this case, include the ALL keyword in the join command to retrieve all matching records. For example:

```
JOIN FIELDA IN FILE1 TO ALL FIELDB IN FILE2 AS J1
```

Join syntax is described in the *FOCUS for IBM Users Manual*.

The following example illustrates the JOIN command:

```
JOIN KEY IN GL001IVP TO KEY IN GL002IVP AS J
TABLE FILE GL001IVP
PRINT KEY ACCT_DESC ACCT_OWNER
END
```

Note: All databases used in a single request (for example, a JOIN) must use the same lead transaction ID (TRANID). See Chapter 2, *Creating FOCUS Descriptions*, for information about TRANID.

A Sample File Descriptions and Requests

This appendix contains sample Master and Access Files, and requests.

A.1 Sample File Descriptions

This section contains Master Files for the ACCTMAST and IVP sample Millennium databases cited in previous chapters. The Master Files shown are for Millennium Release 2.

A.1.1 ACCTMAST Sample

The following partial Master File describes the ACCTMAST database:

```
FILE=ACCTMAST              ,SUFFIX=CPMILL,$
SEGNAME=ROOT,SEGTYPE=S0,$
 FIELDNAME=DELETE_FLAG     ,ALIAS=      ,USAGE=A1    ,ACTUAL=A1  ,$
 GROUP=CONTRL_KEY          ,ALIAS=KEY   ,USAGE=A23   ,ACTUAL=A23 ,$
  FIELDNAME=CORP           ,ALIAS=      ,USAGE=A3    ,ACTUAL=A3  ,$
  FIELDNAME=ACCOUNT        ,ALIAS=      ,USAGE=A10   ,ACTUAL=A10 ,$
  FIELDNAME=COST_CENTR     ,ALIAS=      ,USAGE=A10   ,ACTUAL=A10 ,$
 FIELDNAME=LRECL           ,ALIAS=      ,USAGE=P4    ,ACTUAL=P3  ,$
 FIELDNAME=ACCT_TYPE       ,ALIAS=      ,USAGE=A1    ,ACTUAL=A1  ,$
 FIELDNAME=ACCT_DESC       ,ALIAS=      ,USAGE=A35   ,ACTUAL=A35 ,$
 FIELDNAME=FILLER          ,ALIAS=      ,USAGE=A54   ,ACTUAL=A54 ,$
 FIELDNAME=SLID            ,ALIAS=      ,USAGE=A1    ,ACTUAL=A1  ,$
 FIELDNAME=FILLER          ,ALIAS=      ,USAGE=A25   ,ACTUAL=A25 ,$
 FIELDNAME=REPORT_KEY      ,ALIAS=      ,USAGE=A90   ,ACTUAL=A90 ,$
 FIELDNAME=FILLER          ,ALIAS=      ,USAGE=A80   ,ACTUAL=A80 ,$
 FIELDNAME=ACT_IND_3YR     ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=ACT_IND_2YR     ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=ACT_IND_LYR     ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=ACT_IND_CYR     ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=B1_IND          ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=B2_IND          ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=B3_IND          ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=B4_IND          ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=B5_IND          ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=B6_IND          ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=AVG_IND_3YR     ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=AVG_IND_2YR     ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=AVG_IND_LYR     ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=AVG_IND_CYR     ,ALIAS=      ,USAGE=I1    ,ACTUAL=A1  ,$
 FIELDNAME=CUR_BAL         ,ALIAS=      ,USAGE=P15.2 ,ACTUAL=P8  ,$
 FIELDNAME=FILLER          ,ALIAS=      ,USAGE=A64   ,ACTUAL=A64 ,$
 FIELDNAME=BATCH_BAL       ,ALIAS=      ,USAGE=A15.2 ,ACTUAL=P8  ,$
```

The ACCTMAST Access File corresponds to the ACCTMAST Master File:

```
DBID=GLM,$
```

A.1.2 GL001IVP Sample

The following Master File describes the IVP (Installation Verification Program) database for Millennium Release 2:

```
FILE=GL001IVP                ,SUFFIX=CPMILL ,$
SEGNAME=ROOT,SEGTYPE=S0,$
 GROUP=CONTRL_KEY           ,ALIAS=KEY    ,USAGE=A56    ,ACTUAL=A56 ,$
  FIELDNAME=DBID            ,ALIAS=       ,USAGE=A3     ,ACTUAL=A3  ,$
  FIELDNAME=CORP            ,ALIAS=       ,USAGE=A3     ,ACTUAL=A3  ,$
  FIELDNAME=ACCOUNT         ,ALIAS=       ,USAGE=A10    ,ACTUAL=A10 ,$
  FIELDNAME=COST_CENTR      ,ALIAS=       ,USAGE=A10    ,ACTUAL=A10 ,$
  FIELDNAME=FILLER          ,ALIAS=       ,USAGE=A30    ,ACTUAL=A30 ,$
 FIELDNAME=LRECL            ,ALIAS=       ,USAGE=P4     ,ACTUAL=P3  ,$
 FIELDNAME=ACCT_TYPE        ,ALIAS=       ,USAGE=A1     ,ACTUAL=A1  ,$
 FIELDNAME=ACCT_DESC        ,ALIAS=DESC   ,USAGE=A20    ,ACTUAL=A20 ,$
```

This database does not require an Access File because the Master File member name supplies the correct DBID (that is, IVP), and it uses the default TRANID. You can change the DBID and/or TRANID accessed by creating an Access File member named GL001IVP.

A.1.3 GL002IVP Sample

The following Master File describes the database that participates as the cross-referenced file in the join example in Chapter 4, *Reporting From Millennium Databases*.

```
FILE=GL002IVP                ,SUFFIX=CPMILL ,$
SEGNAME=ROOT,SEGTYPE=S0,$
 GROUP=CONTRL_KEY           ,ALIAS=KEY    ,USAGE=A56    ,ACTUAL=A56 ,$
  FIELDNAME=DBID            ,ALIAS=       ,USAGE=A3     ,ACTUAL=A3  ,$
  FIELDNAME=CORP            ,ALIAS=       ,USAGE=A3     ,ACTUAL=A3  ,$
  FIELDNAME=ACCOUNT         ,ALIAS=       ,USAGE=A10    ,ACTUAL=A10 ,$
  FIELDNAME=COST_CENTR      ,ALIAS=       ,USAGE=A10    ,ACTUAL=A10 ,$
  FIELDNAME=FILLER          ,ALIAS=       ,USAGE=A30    ,ACTUAL=A30 ,$
 FIELDNAME=LRECL            ,ALIAS=       ,USAGE=P4     ,ACTUAL=P3  ,$
 FIELDNAME=ACCT_TYPE        ,ALIAS=       ,USAGE=A1     ,ACTUAL=A1  ,$
 FIELDNAME=ACCT_OWNER       ,ALIAS=OWNER  ,USAGE=A20    ,ACTUAL=A20 ,$
```

This database does not require an Access File because the Master File member name supplies the correct DBID (that is, IVP), and it uses the default TRANID. You can change the DBID and/or TRANID accessed by creating an Access File member named GL002IVP.

A.2 Sample Requests

This section provides examples of report requests and techniques.

A.2.1 Simple Request

The first example prints the values of CORP, ACCOUNT, and COST_CENTER from every record in the database retrieved sequentially:

```
TABLE FILE ACCTMAST
PRINT CORP ACCOUNT COST_CENTER
END
```

A.2.2 Keyed Range Test

This example prints the values of CORP, ACCOUNT, and COST_CENTER for records whose CONTRL_KEY values fall within a range. Since CONTRL_KEY is the primary key, the Interface provides the key information in its call to the Millennium API:

```
TABLE FILE ACCTMAST
PRINT CORP ACCOUNT COST_CENTER
WHERE CONTRL_KEY FROM '170A0010000 175824    '
                 TO   '170A1120004 175803    '
END
```

A.2.3 Partial Key Selection Test

The next example prints the values of CORP, ACCOUNT, and COST_CENTER for records in which CORP is greater than 300. Since CORP is a partial key, the Interface passes the partial key to the Millennium API:

```
TABLE FILE ACCTMAST
PRINT CORP ACCOUNT COST_CENTER
IF CORP GT 300
END
```

A.2.4 HOLD and JOIN Example

The following example illustrates a technique for joining a database to itself. The numbers on the left refer to the explanatory notes that follow the example:

```
   TABLE FILE ACCTMAST
1. PRINT CORP AS 'HCORP' ACCOUNT AS 'HACCOUNT' COST_CENTER AS 'HCC'
   IF CORP GT 300
2. ON TABLE HOLD
   END
3. JOIN HCORP AND HACCOUNT AND HCC IN HOLD TO CORP AND ACCOUNT AND
   COST_CENTER IN ACCTMAST
   END
4. TABLE FILE HOLD
   PRINT HCORP CORP HACCOUNT ACCOUNT HCC COST_CENTER
   END
```

Note:

1. This request prints the values of CORP, ACCOUNT, and COST_CENTER for records in which CORP is greater than 300. It specifies column titles different from the names of the fields.
2. The ON TABLE HOLD statement saves the results in a temporary HOLD file. The fieldnames in this file are the column titles specified by the AS phrases in the TABLE request.
3. The JOIN command joins the HOLD file to the original file by matching the values of HCORP, HACCOUNT, and HCC from the HOLD file to CORP, ACCOUNT, and COST_CENTER from the original file. These fields comprise the key of the original file.
4. This request prints the values of HCORP, CORP, HACCOUNT, ACCOUNT, HCC, and COST_CENTER from the joined structure. Notice that the request uses the name of the host file to report from the joined structure.

A.2.5 RECORDLIMIT Example

The next request includes a RECORDLIMIT test to limit the number of records that will print in the report.

```
TABLE FILE ACCTMAST
PRINT CORP ACCOUNT COST_CENTER
IF RECORDLIMIT EQ 10
END
```

You may want to halt retrieval after part of the database has been read when:

- You are testing a new Master File. A few records are adequate to determine whether the description is correct.
- You are testing a new report format.
- You need to generate a trace for debugging purposes.
- The Database Administrator wants to limit search and retrieval for very large databases.

A.2.6 Multiple Key Selection Tests

These examples illustrate the use of multiple IF tests, one on each part of the key. A record must pass all the tests in order to be included in the report. In these examples, the selection criteria are based on key fields, so retrieval is keyed:

```
TABLE FILE ACCTMAST
PRINT CORP ACCOUNT COST_CENTER
IF CORP EQ 170
IF ACCOUNT EQ A1120004
IF COST_CENTER EQ 175803
END
```

```
TABLE FILE ACCTMAST
PRINT CORP ACCOUNT COST_CENTER
IF CORP EQ 170
IF ACCOUNT LE A0050001
END
```

A.2.7 COUNT Example

This example counts the occurrences of the field CORP in the database.

```
TABLE FILE ACCTMAST
COUNT CORP
END
```

A.2.8 Equality Test on a Primary Key

This example includes an EQ test on the primary key field. Therefore, the Interface provides the Millennium API with the key information needed to directly read the appropriate record:

```
TABLE FILE ACCTMAST
PRINT CORP ACCOUNT COST_CENTER
IF CONTRL_KEY EQ '170A0010000 175824    '
END
```

B Tracing Interface Processing

When you submit a report request, the Interface generates calls to the Millennium DBMS on your behalf. You can use the GPTRACE facility to view these calls and their results.

A trace is helpful for debugging a procedure or for Interface performance analysis. The GPTRACE facility is easy to invoke and requires no changes to either the Interface or user request. The trace facility does not affect how the Interface functions.

GPTRACE shows each call to the Interface, each call to the Millennium API (Application Programming Interface), and the return codes from each call.

To activate GPTRACE, allocate the trace output as described in the following section.

Note: Trace facilities are intended for use in query optimization and problem debugging. Do not write application programs that depend on the format or content of any trace, as these are liable to change in later releases.

B.1 Allocating GPTRACE

You can use GPTRACE in conjunction with all report requests. Trace output can be stored in a sequential dataset or displayed on-line at the terminal. Use the system editor to view the file containing the trace information.

To capture trace data in a file, specify the appropriate statement from the FOCUS command level

```
{TSO}
{MVS} ALLOC F(GPTRACE) DA('userid.GPTRACE') SHR REU
```

or:

```
DYNAM ALLOC FILE GPTRACE DATASET userid.GPTRACE SHR REUSE
```

To display trace data on-line, specify the appropriate statement from the FOCUS command level

```
{TSO}
{MVS} ALLOC F(GPTRACE) DA(*) SHR REU
```

or:

```
DYNAM ALLOC FILE GPTRACE DA *
```

Note: You must not include DCB information in trace allocations.

B.2 Disabling GPTRACE

To disable GPTRACE, clear the associated allocation

```
{TSO}
{MVS} FREE F(GPTRACE)
```

or:

```
DYNAM FREE FILE GPTRACE
```

B.3 Batch Trace Allocation

You can write trace results to a sequential file, a partitioned dataset, or, as in the following sample allocation, to SYSOUT. You must not include DCB information in your trace allocations:

```
//GPTRACE   DD SYSOUT=*
```

The following example writes the trace results to an MVS sequential dataset

```
//FSBATCH EXEC PGM=FOCUS
//GPTRACE DD   DISP=(NEW,CATLG,KEEP),DSN=userid.GPTRACE,
//            UNIT=SYSALLDA,VOL=SER=volid,SPACE=(TRK,(p,s))
```

where:

`volid`	Is the volume id of the dataset that will receive the trace output.
`p`	Is the number of tracks in the primary space allocation.
`s`	Is the number of tracks in the secondary space allocation.

B.4 GPTRACE Example

This TSO session traces the retrieval process for a report request. GPTRACE is allocated before the report request is issued; its results display on-line.

The request is:

```
>  > tso alloc f(gptrace) da(*)
>  > table file gl001ivp
>  > print key acct_desc
>  > end
```

Note: A trace can produce extensive output; therefore, you may want to use a RECORDLIMIT test in your request to reduce the amount of redundant information you will have to examine.

The following annotated example illustrates GPTRACE results for the request for Millennium Release 2. Millennium Release 3 trace results may differ slightly. The numbers on the left refer to explanatory notes that follow the trace:

```
1.  ... FOCMIL   FOCMILLD Loader Being Initialized
    ... FOCMIL   FOCMILLD Loader Ready
    ... FOCMIL   FOCMILP  Parser Being Initialized
    ... FOCMIL   FOCMILP  Parser Ready
    ... FOCMIL   Work Areas Initialized ...
    ... FOCMIL   API CVT Initialized at 065B0328
      --> FOCMIL   Initializing API, EPA: 0001F360
      <-- FOCMIL   API Initialized,  R15: 00000000 SEVERITY: 00
2.  ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: O
    ... FOCMIL   FOCMILP  Now Processing     FILE: GL001IVP
    ... FOCMIL   FOCMILP  Found Parameter  TRANID: M2LL
    ... FOCMIL   FOCMILP  Found Parameter    DBID: IVP
    ... FOCMIL   NO API Call for Opens ...
    <== FOCMIL   Now Returning NCHAR: 00000000       RC: 00000000
3.  ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: R
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    ... FOCMIL   API Positioned,    DBID: IVP
    <== FOCMIL   Now Returning NCHAR: 00000000       RC: 00000000
4.  ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
```

```
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
  --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
  <-- API Has Returned  R15: 00000000 SEVERITY: 00
<== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
```

```
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000050       RC: 00000000
    ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: S
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID: IVP
5.    <-- API Has Returned  R15: 00000000 SEVERITY: 04
    ... FOCMIL   API EOF Detected,  DBID: IVP
    <== FOCMIL   Now Returning NCHAR: 00000000       RC: 00000000
6.  ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: C
      --> API Being Called  EPA: 0001F448 TRANID: M2LL DBID:
      <-- API Has Returned  R15: 00000000 SEVERITY: 00
    <== FOCMIL   Now Returning NCHAR: 00000000       RC: 00000000
7.  ==> FOCMIL   Now Processing   DDN: GL001IVP      OPT: F
    ... FOCMIL   NO API Call Needed for FIN ...
    =*=*=*=*= FOCMIL   Processing ENDING =*=*=*=*=
```

The trace shows:

1. The call to initialize the API and all work areas required by the Interface.
2. The open call (OPT O); this call is not required by Millennium. The Interface passes the database ID (DBID=IVP) and the lead transaction ID (TRANID=M2LL for Millennium Release 2 or TRANID=M3LL for Millennium Release 3) to the API. The ddname allocated to this database is GL001IVP.
3. The locate request call (OPT R) that positions the Interface at the first record required by the request.
4. The first sequential read call (OPT S).The severity code is the return code from the Millennium DBMS to the Millennium API. NCHAR is the number of bytes (in hexadecimal) retrieved. RC is the return code from the Millennium API to the Interface.

   Depending on the selection criteria in your FOCUS request, you may see the following OPT codes:

   E Direct read. Used for joins and for an equality condition on the primary key field.

   G Positioning at the start of a keyed range.

5. The last sequential read. Severity code 04 indicates end of file. NCHAR is 0.
6. The call to close the database (OPT C); the blank DBID closes the API and all files.
7. Exit processing (OPT F, finish). No call to the API is required. The following message indicates that the Interface is shutting down:

```
FOCMIL   PROCESSING ENDING
```

The following report is generated:

```
NUMBER OF RECORDS IN TABLE=       25  LINES=     25

PAGE     1


CONTRL_KEY                ACCT_DESC
----------                ---------
170A00100000 1758240      CASH IN BANKS FC
170A00400010 1041620      CASH IN TRANSIT US
170A00500010 1758030      CASH IN BANKS US
170A00501180 1041620      CASH IN BANKS LC
170A00501180 1758030      CASH IN BANKS LC
170A00501180 1758220      CASH IN BANKS LC
170A00501180 1758230      CASH IN BANKS LC
170A00501180 1759020      CASH IN BANKS LC
170A11200040 1041620      CUSTOMER A/R-LOCAL
170A11200040 1758030      CUSTOMER A/R-LOCAL
170A11200040 1758230      CUSTOMER A/R-LOCAL
170A11200040 1758240      CUSTOMER A/R-LOCAL
170A11200040 1759020      CUSTOMER A/R-INT
170A11200050 1041620      CUSTOMER A/R-LOCAL
170A11200050 1759020      CUSTOMER A/R-LOCAL
170A12120010 1041620      CUSTOMER A/R-LOCAL
170A12120010 1758220      CUSTOMER A/R-INT
170A12120010 1759020      CUSTOMER A/R-LOCAL
170A12220020 1758030      CUSTOMER A/R-LOCAL
170A12220020 1758230      CUSTOMER A/R-LOCAL
170A12220020 1759020      CUSTOMER A/R-INT
170A12240200 1041620      CUSTOMER A/R-LOCAL
170A12240200 1758240      CUSTOMER A/R-LOCAL
170A12240200 1759020      CUSTOMER A/R-INT
170A12240990 1759020      CUSTOMER A/R-FOR
```

C Interface Errors and Messages

This appendix contains a list of Interface error and informational messages. They are subject to change.

C.1 Interface Messages

The Interface can issue the following messages to the FOCUS console as a result of severe processing failure:

(FML9998E) CALLING CONTEXT INVALID
The Interface found an invalid calling parameter list. Contact IBI support.

(FML9999E) GETMAIN WORK FAILURE
The Interface could not initialize a working storage area. Provide a larger main storage area for execution.

FOCUS can issue the following messages in addition to any messages that are issued by the Millennium API (for information about Millennium API messages, consult the appropriate Millennium documentation):

(FML0001E) API FAILURE
The Interface detected that the API did not complete a request. Re-run with GPTRACE and contact IBI support.

(FML0002E) GETMAIN BELOW 16M FAILURE
The Interface could not initialize AMODE 24 storage. Provide a larger main storage area for execution.

(FML0003E) GETMAIN FOR I/O FAILURE
The Interface could not initialize AMODE 24 storage. Provide a larger main storage area for execution.

(FML0004E) GETMAIN FOR TABLE FAILURE
The Interface could not initialize control storage. Provide a larger main storage area for execution.

(FML0005E) FOCMIL PROCESSING FAILURE
The Interface could not complete a request. Re-run with GPTRACE and contact IBI support.

(FML0006E) CALLING OPTION INVALID
The Interface detected an invalid request. Re-run with GPTRACE and contact IBI support.

(FML0007E) JOIN MAXIMUM EXCEEDED
The request exceeded the 256 file join maximum. Change the request to use fewer than 256 files at once.

D Millennium Release 2 Installation

This appendix describes how to install the Interface for Millennium Release 2. It assumes that systems support staff, not end users, will read this appendix and install the software.

Note: The explanations in this appendix assume that all of your FOCUS and Interface libraries are catalogued under the same MVS high-level qualifier. The examples throughout this appendix use the identifier 'prefix' to refer to this high-level qualifier.

D.1 Pre-installation and Maintenance Requirements

Before you begin to install the Interface, you should be aware of installation prerequisites and consider maintenance procedures that may affect the installation process. This section describes pre-installation and maintenance requirements.

These instructions assume that the person performing the installation and maintenance procedures has a working knowledge of MVS. If you are installing the Interface with the FOCUS Multi-Session Option (MSO), MSO knowledge is required. Knowledge of FOCUS and Millennium calls is not required.

Your Millennium administrator will have to provide site-specific information.

Read this guide thoroughly before installing the Interface to ensure correct installation.

D.1.1 Software Requirements

Before you install the Interface, please review the following list of software requirements:

- Millennium must be installed and fully operational. If it is not, contact your Millennium administrator.
- FOCUS must be installed on your system and fully operational. If it is not, contact your FOCUS database administrator, or consult the appropriate FOCUS installation guide for installation instructions.

  You also need to know the FOCUS Release and maintenance level. You can use either of the following methods to identify your release:

  - Check the numbers printed on the label of the distribution tape used to install FOCUS.
  - Invoke FOCUS. At the start of each session, FOCUS displays the release number. To also display the maintenance level, issue the ? RELEASE query command.

  Every copy of FOCUS has a release number and a maintenance level.

The following two libraries are among the datasets that were unloaded from the FOCUS distribution tape when FOCUS was installed:

- FOCLIB.LOAD. This library contains the FOCUS and Interface load modules.
- FOCCTL.DATA. This library contains JCL, utility programs, and data needed in the Interface installation process.

D.1.2 Maintenance

There are no maintenance procedures that you must perform regularly to ensure proper functioning of the Interface. You can install a new release of FOCUS without re-installing the Interface, unless you have chosen to customize the installation as described in Section D.3.1, *Customization Instructions*, or to bind the API modules as described in Section D.3.2, *API Binding*.

If you receive a program temporary fix (PTF) that affects the Interface, it will be accompanied by a cover letter containing installation instructions. If you still have installation questions after reading the cover letter, contact Information Builders Installation Support Services in New York at (800) 736-6130 or your local Information Builders representative.

D.2 Installation Overview

The Millennium Interface is included on the FOCUS distribution tape, and all necessary load modules were created when your site installed FOCUS. The Interface works only on the MVS/XA or MVS/ESA operating systems. It is fully reentrant and reusable as long as you link the Millennium API modules dynamically, as described in Section D.4.3, *Link the Millennium X2XBSRC and X2XBIO Modules*.

Prior to installing the Interface, you can customize your configuration. Interface customization is described in the next section.

D.3 Optional Interface Customization

Prior to installing the Interface, you can optionally customize your configuration by changing the following system defaults:

- Default lead transaction ID for the Multi:Mill feature.
- Default trace option and limits.
- API entry names.

These options are described in Section D.3.1, *Customization Instructions*.

If the Millennium API cannot be made available at run-time, you can link the Millennium API modules into the Interface as described in Section D.3.2, *API Binding*. Since the nature of the Millennium modules limits the resulting Interface load module to one addressing mode and renders it non-reentrant, this method of making the Millennium modules available to FOCUS is not recommended. The preferred method, dynamic linking, is described in Section D.4.3, *Link the Millennium X2XBSRC and X2XBIO Modules.*

If you are satisfied with Interface default behavior, skip this section and go on to Section D.4, *Installation Steps*.

D.3.1 Customization Instructions

The job that customizes Interface defaults consists of three steps:

Step	Establishes:
1	API entry names (affects only *dynamic* API calls. See Section D.4.3, *Link the Millennium X2XBSRC and X2XBIO Modules*).
2	Default lead transaction ID.
3	Trace status and limits.

If you do not need to change any of the installation defaults, disregard these instructions and go on to the next section.

To customize your configuration for Millennium Release 2, run the customization JCL (found in member CPMILLZP of the 'prefix.FOCCTL.DATA' dataset) after editing it to conform to your site's standards and adding a JOB card. Sample JCL follows. The numbers on the left refer to the explanatory notes that follow the JCL:

```
    //job card goes here
    //*
    //*******************************************************************
    //* REPLACE prefix.FOCLIB.LOAD WITH DSN OF YOUR LIBRARY TO BE ZAPPED
    //*
    //* THIS ZAPS FOCMIL LOAD MODULE
    //* IF YOU NORMALLY LPA THIS MODULE INTO YOUR SYSTEM YOU MUST
    //* STEPLIB TO THE ZAPPED MODULE, MLPA THE ZAPPED MODULE, OR PLPA
    //* THE ZAPPED MODULE.
    //*
    //* THIS ZAP IS SET FOR THE 1.01 VERSION OF THE MODULE
    //* IF THE VERIFIES FAIL, LOOK IN THE FIRST DUMP FOR THE VERSION
    //* OF YOUR MODULE, AND CONTACT IBI...
    //*******************************************************************
    //APINAMES EXEC PGM=IMASPZAP
    //SYSPRINT DD SYSOUT=*
1.  //SYSLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
    //SYSIN    DD *
    NAME FOCMIL   FOCMIL
    *
    * VERIFY VERSION
    *
    VER 0004 1CF1,F0F1                  VERSION 1.01
    /*
2.  //APINAMES EXEC PGM=IMASPZAP,COND=(0,LT)
    //SYSPRINT DD SYSOUT=*
1.  //SYSLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
    //SYSIN    DD *
    * SET API ENTRY NAMES OR RESET VCONS
    * THERE ARE 8 SETS OF ENTRIES,
    * ZERO VCONS INDICATE THAT THE API FUNCTION IS DYNAMIC
    * BLANK ENTRY NAMES INDICATE THE FUNCTION IS NOT SUPPORTED BY THE API
    *

    NAME FOCMIL   APICVT$$
    *
    * API ENTRIES
    *
```

```
3.  REP 0000 0000,0000                  INITIALIZATION VCON - DYNAMIC
    REP 0004 E7F2,E7C2,E2D9,C340        INITIALIZATION NAME - X2XBSRC
    REP 0020 0000,0000                  OPEN           VCON - DYNAMIC
    REP 0024 4040,4040,4040,4040        OPEN           NAME - NA
    REP 0040 0000,0000                  LOCATE         VCON - DYNAMIC
    REP 0044 E7F2,E7C2,C9D6,4040        LOCATE         NAME - X2XBIO
    REP 0060 0000,0000                  GENERIC GET    VCON - DYNAMIC
    REP 0064 E7F2,E7C2,C9D6,4040        GENERIC GET    NAME - X2XBIO
    REP 0080 0000,0000                  SEQUENTIAL GET VCON - DYNAMIC
    REP 0084 E7F2,E7C2,C9D6,4040        SEQUENTIAL GET NAME - X2XBIO
    REP 00A0 0000,0000                  DIRECT GET     VCON - DYNAMIC
    REP 00A4 E7F2,E7C2,C9D6,4040        DIRECT GET     NAME - X2XBIO
    REP 00C0 0000,0000                  CLOSE          VCON - DYNAMIC
    REP 00C4 E7F2,E7C2,C9D6,4040        CLOSE          NAME - X2XBIO
    REP 00E0 0000,0000                  FINISH         VCON - DYNAMIC
    REP 00E4 4040,4040,4040,4040        FINISH         NAME - NA
    /*
    //*
4.  //TRANSACT EXEC PGM=IMASPZAP,COND=(0,LT)
    //SYSPRINT DD SYSOUT=*
1.  //SYSLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
    //SYSIN    DD *
    *
    * DEFAULT LEAD TRANSACTION
    *
    NAME FOCMIL   TRANSACT
5.  REP 0004 D4F2,D3D3                  LEAD TRANSACTION - M2LL
    /*
    //*
6.  //TRACECTL EXEC PGM=IMASPZAP,COND=(0,LT)
    //SYSPRINT DD SYSOUT=*
1.  //SYSLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
    //SYSIN    DD *
    *
    * TRACE CONTROL
    * THE FIRST BYTE ALLOWS TRACING IF NOT ZERO
    * THE NEXT FULL WORD SET THE LIMIT ON THE AMOUNT OF TRACING
    *
    NAME FOCMIL   TRACECTL
7.  REP 0000 FF                    TRACE EVENTS - YES
8.  REP 0004 FFFF,FFFF             MAXIMUM TRACE EVENTS WRITTEN - 999999999
    /*
```

where:

`prefix` Is the high-level qualifier for your site's FOCUS production libraries.

1. Edit these statements to provide the high-level qualifier for your site's FOCUS production libraries.

2. This statement begins the step that establishes API entry names. It affects only dynamic API calls.

3. These REP statements specify the default API entry names. They are:

API Function	Description	Default
INITIALIZATION	File initialization	X2XBSRC
OPEN	Open for file	Not supported by the API
LOCATE	Initial position for file	X2XBIO
GENERIC GET	Perform partial key retrieval	X2XBIO
SEQUENTIAL GET	Retrieve next physical record	X2XBIO
DIRECT GET	Perform exact key retrieval	X2XBIO
CLOSE	Close for file	X2XBIO
FINISH	Perform final file closure	Not supported by the API

   If you want to change these entry names, edit the REP statements.

4. This statement begins the step to establish the default lead transaction ID.
5. This REP statement makes M2LL the default lead transaction ID. If you want a different default, edit this REP statement.
6. This statement begins the step to establish trace options.
7. By default, traces are allowed. To prohibit traces, change the string ‘FF’ to ‘00’.
8. By default, unlimited trace events are allowed. To limit the amount of trace output, change the string ‘FFFF,FFFF’ to any hexadecimal value between ‘0000,0000’ and ‘FFFF,FFFF’.

D.3.2 API Binding

By default, the Interface is shipped as RMODE(ANY), and it dynamically loads API code. You also have the option of binding the API modules to the Interface. Since the Millennium X2XBSRC and X2XBIO modules require AMODE(24) and RMODE(24), this method of making the Millennium modules available to FOCUS restricts the Interface's addressing mode and renders it non-reentrant. Dynamic linking, described in Section D.4.3, *Link the Millennium X2XBSRC and X2XBIO Modules*, provides a better solution for making Millennium modules available to FOCUS.

If you want to bind the API modules to the Interface, submit the following JCL (found in member CPMILLLK of the 'prefix.FOCCTL.DATA' library) after editing it to conform to your site's standards and adding a JOB card. Sample JCL follows. The numbers on the left refer to the notes that follow the JCL:

```
   //job card goes here
   //*
   //*   BIND API TO FOCMIL NON-REENTRANT NON-REUSABLE
   //*   X2XBSRC AND X2XBIO OBJECT LIBRARY MUST BE AVAILABLE
   //*
   //FOCMILLK EXEC PGM=IEWL,PARM='AUTO,LIST,LET,MAP,SIZE=2048K'
1. //SYSLIB   DD   DISP=SHR,DSN=millen.objlib
2. //         DD   DISP=SHR,DSN=millen.genlib
3. //SYSLIN   DD   DISP=SHR,DSN=prefix.FOCLIB.LOAD(FOCMIL)
   //         DD   DDNAME=SYSIN
1. //CPMILLO  DD   DISP=SHR,DSN=millen.objlib
3. //SYSLMOD  DD   DISP=SHR,DSN=prefix.FOCLIB.LOAD
   //SYSUT1   DD   UNIT=SYSALLDA,SPACE=(CYL,(10,1))
   //SYSPRINT DD   SYSOUT=*
   //SYSIN    DD   *
     INCLUDE CPMILLO(X2XBSRC)
     INCLUDE CPMILLO(X2XBIO)
     ENTRY   FOCMIL
     MODE AMODE(24),RMODE(24)
     NAME FOCMIL(R)
   /*
```

where:

`prefix` Is the high-level qualifier for your site's FOCUS production libraries.

Note:

1. Edit these statements to provide the dataset name of your site's Millennium object library.
2. Edit this statement to provide the dataset name of your site's object library.
3. Edit these statements to provide the high-level qualifier for your site's FOCUS production libraries.

D.4 Installation Steps

The installation process consists of three steps. If you need a customized configuration, you must follow the instructions in Section D.3, *Optional Interface Customization*, before executing the following installation steps:

1. Create the Access File library. See Section D.4.1, *Create the Access File Library*.
2. Run the Installation Verification Program (IVP). See Section D.4.2, *Run the Installation Verification Program (IVP)*.
3. Link the Millennium API modules, X2XBSRC and X2XBIO. See Section D.4.3, *Link the Millennium X2XBSRC and X2XBIO Modules.*

The following sections describe each step in detail.

D.4.1 Create the Access File Library

At run time, the Interface must have access to five libraries. Four of these libraries were created when FOCUS was installed; you must now create the remaining library. At execution time, users allocate these libraries with a CLIST or with batch JCL, as described in Chapter 3, *Getting Started*.

Each Interface user must have access to the following libraries:

Library	Description
prefix.FOCLIB.LOAD	The prefix.FOCLIB.LOAD library was created when FOCUS was installed. It contains the FOCUS and Interface load modules.
MASTER	The MASTER library was created when FOCUS was installed. At execution time, users allocate this library to ddname MASTER. Its members are Master Files. A Master File describes the fields in a Millennium database. Each database accessed by the Interface must be described to FOCUS in a Master File. The Master File library that is supplied with FOCUS includes the IVP Master Files used in examples throughout this manual. They are illustrated in Appendix A, *Sample File Descriptions and Requests*.
FOCEXEC	The FOCEXEC library was created FOCUS was installed. At execution time, users allocate this library to ddname FOCEXEC. Its members are FOCUS procedures (FOCEXECs).

Library	Description
ERRORS	The ERRORS library was created when FOCUS was installed. At execution time, users allocate this library to ddname ERRORS. It contains the text of all error messages generated by FOCUS.
Access File	You must create prefix.FOCPRV.DATA, the Access File library; at execution time, users allocate it to ddname FOCPRV. Each member in the Access File dataset corresponds to a particular member in the Master File dataset. An Access File assigns the database ID and/or lead transaction ID to use with its corresponding Master File.

The following example illustrates how to create the Access File library using the IEFBR14 utility:

```
//STEP1  EXEC PGM=IEFBR14
//FOCPRV DD   DSN=prefix.FOCPRV.DATA,DISP=(NEW,CATLG),
//            DCB=(DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=1600),
//            SPACE=(TRK,(p,s,d)),VOL=SER=xxx
```

where:

`prefix` Is the high-level qualifier for your FOCUS production datasets.

`xxx` Is a valid volume id for your site.

`p` Is the primary space allocation. Usually, 5 tracks are sufficient.

`s` Is the secondary space allocation. Usually, 1 track is sufficient.

`d` Is the allocation for directory blocks. Usually, 45 is sufficient.

Many sites create private and public versions of the FOCEXEC, MASTER, and FOCPRV libraries to make maintenance easier. For example, you can create private FOCEXEC libraries for users' personal sets of FOCEXECs, and retain one general site FOCEXEC library for all users to access.

If you want private and public libraries, you can create the additional libraries now. (First check to see if private libraries already exist.) The additional libraries should have the same DCB attributes as the original libraries.

D.4.2 Run the Installation Verification Program (IVP)

The Installation Verification Program (IVP), supplied as member CPMILLIV of the 'prefix.FOCEXEC.DATA' library, tests your Interface installation. It creates two members in the Access File PDS and verifies that the Interface has access to its libraries. You have the option of either executing the IVP on-line from within a FOCUS session or submitting it as a batch job.

To run the IVP on-line:

1. Start a FOCUS session.
2. Execute CPMILLIV. It will prompt you to supply the dataset names for ddnames FOCCTL and FOCPRV.

To run the IVP in batch:

1. Edit the JCL found in member CPMILLIV of the 'prefix.FOCCTL.DATA' library to provide the dataset names allocated to ddnames FOCCTL and FOCPRV, and add a JOB card.
2. Submit the edited JCL. Sample JCL follows

```
//job card goes here
//CPMILLIV EXEC PGM=FOCUS,REGION=nn
//STEPLIB  DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
//*
//* FOCUS ALLOCATIONS
//*
//FOCLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
//USERLIB  DD DISP=SHR,DSN=prefix.FUSELIB.LOAD
//MASTER   DD DISP=SHR,DSN=prefix.MASTER.DATA
//FOCEXEC  DD DISP=SHR,DSN=prefix.FOCEXEC.DATA
//ERRORS   DD DISP=SHR,DSN=prefix.ERRORS.DATA
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  EX CPMILLIV FOCCTL=focctldsn,FOCPRV=prefix.FOCPRV.DATA
  FIN
/*
```

where:

`nn`	Is the region size.
`focctldsn`	Is the dataset name allocated to ddname FOCCTL.
`prefix`	Is the high-level qualifier for your site's FOCUS production libraries.

D.4.3 Link the Millennium X2XBSRC and X2XBIO Modules

This step makes the Millennium API modules available to FOCUS through dynamic linking. Dynamic linking enables the Interface to support all combinations of addressing options while remaining fully reentrant and reusable.

Note: If you bound the API modules as described in Section D.3.2, *API Binding*, omit this step; in this case, the Interface is restricted to one addressing mode and loses its reentrant and reusable properties.

To enable dynamic linking, submit link-edit JCL (CPMILLK2) that conforms to your site's standards. A typical example follows

```
//job card goes here
//S1       EXEC PGM=IEWL,PARM='LIST,LET,XREF'
//CPMILL   DD   DISP=SHR,DSN=millen.objlib
//SYSLIB   DD   DISP=SHR,DSN=millen.genlib
//SYSPRINT DD   SYSOUT=*
//SYSUT1   DD   UNIT=SYSALLDA,SPACE=(CYL,(1,1))
//SYSLMOD  DD   DISP=SHR,DSN=millen.loadlib
//SYSLIN   DD   *
INCLUDE CPMILL(X2XBSRC)
NAME X2XBSRC(R)
/*
//S2       EXEC PGM=IEWL,PARM='LIST,LET,XREF'
//CPMILL   DD   DISP=SHR,DSN=millen.objlib
//SYSLIB   DD   DISP=SHR,DSN=millen.genlib
//SYSPRINT DD   SYSOUT=*
//SYSUT1   DD   UNIT=SYSALLDA,SPACE=(CYL,(1,1))
//SYSLMOD  DD   DISP=SHR,DSN=millen.loadlib
//SYSLIN   DD   *
INCLUDE CPMILL(X2XBIO)
NAME X2XBIO(R)
/*
```

where:

`millen`	Is the high-level qualifier for your Millennium production datasets.
`objlib`	Is the Millennium object module library.
`genlib`	Is the Millennium subprogram library.
`loadlib`	Is the Millennium load module library.

D.5 Run-time Requirements

The Interface now resides on your system. Before you invoke the Interface, you must:

- Create a program (a CLIST or REXX EXEC for TSO, a FOCEXEC for MSO, or JCL for a batch environment) that invokes FOCUS, with the Interface, as described in Chapter 3, *Getting Started*.
- Create Master Files and, optionally, Access Files for all Millennium DBID files users will access, as described in Chapter 2, *Creating FOCUS Descriptions.*

D.5.1 MSO Considerations

The MSO server must allocate all Millennium control and database ddnames globally because Millennium software is unaware of any MSO ddname translations that are in effect. Consult the *FOCUS for IBM Mainframe Multi-Session Option Installation and Technical Reference Guide* for complete instructions.

E Millennium Release 3 Installation

This appendix describes how to install the Interface for Millennium Release 3. It assumes that systems support staff, not end users, will read this appendix and install the software.

Note: The explanations in this appendix assume that all of your FOCUS and Interface libraries are catalogued under the same MVS high-level qualifier. The examples throughout this appendix use the identifier 'prefix' to refer to this high-level qualifier.

E.1 Pre-installation and Maintenance Requirements

Before you begin to install the Interface, you should be aware of installation prerequisites and consider maintenance procedures that may affect the installation process. This section describes pre-installation and maintenance requirements.

These instructions assume that the person performing the installation and maintenance procedures has a working knowledge of MVS. If you are installing the Interface with the FOCUS Multi-Session Option (MSO), MSO knowledge is required. Knowledge of FOCUS and Millennium calls is not required.

Your Millennium administrator will have to provide site-specific information.

Read this guide thoroughly before installing the Interface to ensure correct installation.

E.1.1 Software Requirements

Before you install the Interface, please review the following list of software requirements:

- Millennium must be installed and fully operational. If it is not, contact your Millennium administrator.
- FOCUS must be installed on your system and fully operational. If it is not, contact your FOCUS database administrator, or consult the appropriate FOCUS installation guide for installation instructions.

  You also need to know the FOCUS Release and maintenance level. You can use either of the following methods to identify your release:

  - Check the numbers printed on the label of the distribution tape used to install FOCUS.
  - Invoke FOCUS. At the start of each session, FOCUS displays the release number. To also display the maintenance level, issue the ? RELEASE query command.

  Every copy of FOCUS has a release number and a maintenance level.

The following two libraries are among the datasets that were unloaded from the FOCUS distribution tape when FOCUS was installed:

- FOCLIB.LOAD. This library contains the FOCUS and Interface load modules.
- FOCCTL.DATA. This library contains JCL, utility programs, and data needed in the Interface installation process.

E.1.2 Maintenance

There are no maintenance procedures that you must perform regularly to ensure proper functioning of the Interface. You can install a new release of FOCUS without re-installing the Interface, unless you have chosen to customize the installation as described in Section E.3.1, *Customization Instructions*, or to bind the API modules as described in Section E.3.2, *API Binding*.

If you receive a program temporary fix (PTF) that affects the Interface, it will be accompanied by a cover letter containing installation instructions. If you still have installation questions after reading the cover letter, contact Information Builders Installation Support Services in New York at (800) 736-6130 or your local Information Builders representative.

E.2 Installation Overview

The Millennium Interface is included on the FOCUS distribution tape, and all necessary load modules were created when your site installed FOCUS. The Interface works only on the MVS/XA or MVS/ESA operating systems. It is fully reentrant and reusable as long as you link the Millennium API modules dynamically, as described in Section E.4.3, *Link the Millennium X3XBSRC and X3XBIO Modules*.

Prior to installing the Interface, you can customize your configuration. Interface customization is described in the next section.

E.3 Optional Interface Customization

Prior to installing the Interface, you can optionally customize your configuration by changing the following system defaults:

- Default lead transaction ID for the Multi:Mill feature.
- Default trace option and limits.
- API entry names.

These options are described in Section E.3.1, *Customization Instructions*.

If the Millennium API cannot be made available at run-time, you can link the Millennium API modules into the Interface as described in Section E.3.2, *API Binding*. Since the nature of the Millennium modules limits the resulting Interface load module to one addressing mode and renders it non-reentrant, this method of making the Millennium modules available to FOCUS is not recommended. The preferred method, dynamic linking, is described in Section E.4.3, *Link the Millennium X3XBSRC and X3XBIO Modules.*

If you are satisfied with Interface default behavior, skip this section and go on to Section E.4, *Installation Steps*.

E.3.1 Customization Instructions

The job that customizes Interface defaults consists of three steps:

Step	**Establishes:**
1	API entry names (affects only *dynamic* API calls. See Section E.4.3, *Link the Millennium X3XBSRC and X3XBIO Modules*).
2	Default lead transaction ID.
3	Trace status and limits.

If you do not need to change any of the installation defaults, disregard these instructions and go on to the next section.

To customize your configuration for Millennium Release 3, run the customization JCL (found in member CPMILZP3 of the 'prefix.FOCCTL.DATA' dataset) after editing it to conform to your site's standards and adding a JOB card. Sample JCL follows. The numbers on the left refer to the explanatory notes that follow the JCL:

```
    //job card goes here
    //*
    //*******************************************************************
    //* REPLACE prefix.FOCLIB.LOAD WITH DSN OF YOUR LIBRARY TO BE ZAPPED
    //*
    //* THIS ZAPS FOCMIL LOAD MODULE
    //* IF YOU NORMALLY LPA THIS MODULE INTO YOUR SYSTEM YOU MUST
    //* STEPLIB TO THE ZAPPED MODULE, MLPA THE ZAPPED MODULE, OR PLPA
    //* THE ZAPPED MODULE.
    //*
    //* THIS ZAP IS SET FOR THE 1.01 VERSION OF THE MODULE
    //* IF THE VERIFIES FAIL, LOOK IN THE FIRST DUMP FOR THE VERSION
    //* OF YOUR MODULE, AND CONTACT IBI...
    //*******************************************************************
    //APINAMES EXEC PGM=IMASPZAP
    //SYSPRINT DD SYSOUT=*
1.  //SYSLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
    //SYSIN    DD *
    NAME FOCMIL   FOCMIL
    *
    * VERIFY VERSION
    *
    VER 0004 1CF1,F0F1                  VERSION 1.01
    /*
2.  //APINAMES EXEC PGM=IMASPZAP,COND=(0,LT)
    //SYSPRINT DD SYSOUT=*
1.  //SYSLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
    //SYSIN    DD *
    * SET API ENTRY NAMES OR RESET VCONS
    * THERE ARE 8 SETS OF ENTRIES,
    * ZERO VCONS INDICATE THAT THE API FUNCTION IS DYNAMIC
    * BLANK ENTRY NAMES INDICATE THE FUNCTION IS NOT SUPPORTED BY THE API
    *
    NAME FOCMIL   APICVT$$
    *
    * API ENTRIES
    *
```

```
3.  REP 0000 0000,0000                  INITIALIZATION VCON - DYNAMIC
    REP 0004 E7F3,E7C2,E2D9,C340        INITIALIZATION NAME - X3XBSRC
    REP 0020 0000,0000                  OPEN           VCON - DYNAMIC
    REP 0024 4040,4040,4040,4040        OPEN           NAME - NA
    REP 0040 0000,0000                  LOCATE         VCON - DYNAMIC
    REP 0044 E7F3,E7C2,C9D6,4040        LOCATE         NAME - X3XBIO
    REP 0060 0000,0000                  GENERIC GET    VCON - DYNAMIC
    REP 0064 E7F3,E7C2,C9D6,4040        GENERIC GET    NAME - X3XBIO
    REP 0080 0000,0000                  SEQUENTIAL GET VCON - DYNAMIC
    REP 0084 E7F3,E7C2,C9D6,4040        SEQUENTIAL GET NAME - X3XBIO
    REP 00A0 0000,0000                  DIRECT GET     VCON - DYNAMIC
    REP 00A4 E7F3,E7C2,C9D6,4040        DIRECT GET     NAME - X3XBIO
    REP 00C0 0000,0000                  CLOSE          VCON - DYNAMIC
    REP 00C4 E7F3,E7C2,C9D6,4040        CLOSE          NAME - X3XBIO
    REP 00E0 0000,0000                  FINISH         VCON - DYNAMIC
    REP 00E4 4040,4040,4040,4040        FINISH         NAME - NA
    /*
    //*
4.  //TRANSACT EXEC PGM=IMASPZAP,COND=(0,LT)
    //SYSPRINT DD SYSOUT=*
1.  //SYSLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
    //SYSIN    DD *
    *
    * DEFAULT LEAD TRANSACTION
    *
    NAME FOCMIL   TRANSACT
5.  REP 0004 D4F3,D3D3                  LEAD TRANSACTION - M3LL
    /*
    //*
6.  //TRACECTL EXEC PGM=IMASPZAP,COND=(0,LT)
    //SYSPRINT DD SYSOUT=*
1.  //SYSLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
    //SYSIN    DD *
    *
    * TRACE CONTROL
    * THE FIRST BYTE ALLOWS TRACING IF NOT ZERO
    * THE NEXT FULL WORD SET THE LIMIT ON THE AMOUNT OF TRACING
    *
    NAME FOCMIL   TRACECTL
7.  REP 0000 FF                    TRACE EVENTS - YES
8.  REP 0004 FFFF,FFFF             MAXIMUM TRACE EVENTS WRITTEN - 999999999
    /*
```

where:

`prefix` Is the high-level qualifier for your site's FOCUS production libraries.

1. Edit these statements to provide the high-level qualifier for your site's FOCUS production libraries.

2. This statement begins the step that establishes API entry names. It affects only dynamic API calls.

3. These REP statements specify the default API entry names. They are:

API Function	Description	Default
INITIALIZATION	File initialization	X3XBSRC
OPEN	Open for file	Not supported by the API
LOCATE	Initial position for file	X3XBIO
GENERIC GET	Perform partial key retrieval	X3XBIO
SEQUENTIAL GET	Retrieve next physical record	X3XBIO
DIRECT GET	Perform exact key retrieval	X3XBIO
CLOSE	Close for file	X3XBIO
FINISH	Perform final file closure	Not supported by the API

   If you want to change these entry names, edit the REP statements.

4. This statement begins the step to establish the default lead transaction ID.
5. This REP statement makes M3LL the default lead transaction ID. If you want a different default, edit this REP statement.
6. This statement begins the step to establish trace options.
7. By default, traces are allowed. To prohibit traces, change the string ‘FF’ to ‘00’.
8. By default, unlimited trace events are allowed. To limit the amount of trace output, change the string ‘FFFF,FFFF’ to any hexadecimal value between ‘0000,0000’ and ‘FFFF,FFFF’.

E.3.2 API Binding

By default, the Interface is shipped as RMODE(ANY), and it dynamically loads API code. You also have the option of binding the API modules to the Interface. Since the Millennium X3XBSRC and X3XBIO modules require AMODE(24) and RMODE(24), this method of making the Millennium modules available to FOCUS restricts the Interface's addressing mode and renders it non-reentrant. Dynamic linking, described in Section E.4.3, *Link the Millennium X3XBSRC and X3XBIO Modules*, provides a better solution for making Millennium modules available to FOCUS.

If you want to bind the API modules to the Interface, submit the following JCL (found in member CPMILLLK of the 'prefix.FOCCTL.DATA' library) after editing it to conform to your site's standards and adding a JOB card. Sample JCL follows. The numbers on the left refer to the notes that follow the JCL:

```
    //job card goes here
    //*
    //*   BIND API TO FOCMIL NON-REENTRANT NON-REUSABLE
    //*   X3XBSRC AND X3XBIO OBJECT LIBRARY MUST BE AVAILABLE
    //*
    //FOCMILLK EXEC PGM=IEWL,PARM='AUTO,LIST,LET,MAP,SIZE=2048K'
1.  //SYSLIB   DD   DISP=SHR,DSN=millen.objlib
2.  //         DD   DISP=SHR,DSN=millen.genlib
3.  //SYSLIN   DD   DISP=SHR,DSN=prefix.FOCLIB.LOAD(FOCMIL)
    //         DD   DDNAME=SYSIN
1.  //CPMILLO  DD   DISP=SHR,DSN=millen.objlib
3.  //SYSLMOD  DD   DISP=SHR,DSN=prefix.FOCLIB.LOAD
    //SYSUT1   DD   UNIT=SYSALLDA,SPACE=(CYL,(10,1))
    //SYSPRINT DD   SYSOUT=*
    //SYSIN    DD   *
      INCLUDE CPMILLO(X3XBSRC)
      INCLUDE CPMILLO(X3XBIO)
      ENTRY   FOCMIL
      MODE AMODE(24),RMODE(24)
      NAME FOCMIL(R)
    /*
```

where:

`prefix` Is the high-level qualifier for your site's FOCUS production libraries.

Note:

1. Edit these statements to provide the dataset name of your site's Millennium object library.
2. Edit this statement to provide the dataset name of your site's object library.
3. Edit these statements to provide the high-level qualifier for your site's FOCUS production libraries.

E.4 Installation Steps

The installation process consists of three steps. If you need a customized configuration, you must follow the instructions in Section E.3, *Optional Interface Customization*, before executing the following installation steps:

1. Create the Access File library. See Section E.4.1, *Create the Access File Library*.
2. Run the Installation Verification Program (IVP). See Section E.4.2, *Run the Installation Verification Program (IVP)*.
3. Link the Millennium API modules, X3XBSRC and X3XBIO. See Section E.4.3, *Link the Millennium X3XBSRC and X3XBIO Modules.*

The following sections describe each step in detail.

E.4.1 Create the Access File Library

At run time, the Interface must have access to five libraries. Four of these libraries were created when FOCUS was installed; you must now create the remaining library. At execution time, users allocate these libraries with a CLIST or with batch JCL, as described in Chapter 3, *Getting Started*.

Each Interface user must have access to the following libraries:

Library	Description
prefix.FOCLIB.LOAD	The prefix.FOCLIB.LOAD library was created when FOCUS was installed. It contains the FOCUS and Interface load modules.
MASTER	The MASTER library was created when FOCUS was installed. At execution time, users allocate this library to ddname MASTER. Its members are Master Files. A Master File describes the fields in a Millennium database. Each database accessed by the Interface must be described to FOCUS in a Master File. The Master File library that is supplied with FOCUS includes the IVP Master Files used in examples throughout this manual. They are illustrated in Appendix A, *Sample File Descriptions and Requests*.
FOCEXEC	The FOCEXEC library was created when FOCUS was installed. At execution time, users allocate this library to ddname FOCEXEC. Its members are FOCUS procedures (FOCEXECs).

Library	Description
ERRORS	The ERRORS library was created when FOCUS was installed. At execution time, users allocate this library to ddname ERRORS. It contains the text of all error messages generated by FOCUS.
Access File	You must create prefix.FOCPRV.DATA, the Access File library; at execution time, users allocate it to ddname FOCPRV. Each member in the Access File dataset corresponds to a particular member in the Master File dataset. An Access File assigns the database ID and/or lead transaction ID to use with its corresponding Master File.

The following example illustrates how to create the Access File library using the IEFBR14 utility:

```
//STEP1  EXEC PGM=IEFBR14
//FOCPRV DD   DSN=prefix.FOCPRV.DATA,DISP=(NEW,CATLG),
//            DCB=(DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=1600),
//            SPACE=(TRK,(p,s,d)),VOL=SER=xxx
```

where:

`prefix` Is the high-level qualifier for your FOCUS production datasets.

`xxx` Is a valid volume id for your site.

`p` Is the primary space allocation. Usually, 5 tracks are sufficient.

`s` Is the secondary space allocation. Usually, 1 track is sufficient.

`d` Is the allocation for directory blocks. Usually, 45 is sufficient.

Many sites create private and public versions of the FOCEXEC, MASTER, and FOCPRV libraries to make maintenance easier. For example, you can create private FOCEXEC libraries for users' personal sets of FOCEXECs, and retain one general site FOCEXEC library for all users to access.

If you want private and public libraries, you can create the additional libraries now. (First check to see if private libraries already exist.) The additional libraries should have the same DCB attributes as the original libraries.

E.4.2 Run the Installation Verification Program (IVP)

The Installation Verification Program (IVP), supplied as member CPMILLIV of the 'prefix.FOCEXEC.DATA' library, tests your Interface installation. It creates two members in the Access File PDS and verifies that the Interface has access to its libraries. You have the option of either executing the IVP on-line from within a FOCUS session or submitting it as a batch job.

To run the IVP on-line:

1. Start a FOCUS session.
2. Execute CPMILLIV. It will prompt you to supply the dataset names for ddnames FOCCTL and FOCPRV.

To run the IVP in batch:

1. Edit the JCL found in member CPMILLIV of the 'prefix.FOCCTL.DATA' library to provide the dataset names allocated to ddnames FOCCTL and FOCPRV, and add a JOB card.
2. Submit the edited JCL. Sample JCL follows

```
//job card goes here
//*
//CPMILLIV EXEC PGM=FOCUS,REGION=nn
//STEPLIB  DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
//*
//* FOCUS ALLOCATIONS
//*
//FOCLIB   DD DISP=SHR,DSN=prefix.FOCLIB.LOAD
//USERLIB  DD DISP=SHR,DSN=prefix.FUSELIB.LOAD
//MASTER   DD DISP=SHR,DSN=prefix.MASTER.DATA
//FOCEXEC  DD DISP=SHR,DSN=prefix.FOCEXEC.DATA
//ERRORS   DD DISP=SHR,DSN=prefix.ERRORS.DATA
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  EX CPMILLIV FOCCTL=focctldsn,FOCPRV=prefix.FOCPRV.DATA
  FIN
/*
```

where:

`nn`	Is the region size.
`focctldsn`	Is the dataset name allocated to ddname FOCCTL.
`prefix`	Is the high-level qualifier for your site's FOCUS production libraries.

E.4.3 Link the Millennium X3XBSRC and X3XBIO Modules

This step makes the Millennium API modules available to FOCUS through dynamic linking. Dynamic linking enables the Interface to support all combinations of addressing options while remaining fully reentrant and reusable.

Note: If you bound the API modules as described in Section E.3.2, *API Binding*, omit this step; in this case, the Interface is restricted to one addressing mode and loses its reentrant and reusable properties.

To enable dynamic linking, submit link-edit JCL (CPMILLK3) that conforms to your site's standards. A typical example follows

```
//job card goes here
//S1       EXEC PGM=IEWL,PARM='LIST,LET,XREF,RENT'
//CPMILL   DD   DISP=SHR,DSN=millen.objlib
//SYSLIB   DD   DISP=SHR,DSN=millen.genlib
//SYSPRINT DD   SYSOUT=*
//SYSUT1   DD   UNIT=SYSALLDA,SPACE=(CYL,(1,1))
//SYSLMOD  DD   DISP=SHR,DSN=millen.loadlib
//SYSLIN   DD   *
INCLUDE CPMILL(X3XBSRC)
NAME X3XBSRC(R)
/*
//S2       EXEC PGM=IEWL,PARM='LIST,LET,XREF,RENT'
//CPMILL   DD   DISP=SHR,DSN=millen.objlib
//SYSLIB   DD   DISP=SHR,DSN=millen.genlib
//SYSPRINT DD   SYSOUT=*
//SYSUT1   DD   UNIT=SYSALLDA,SPACE=(CYL,(1,1))
//SYSLMOD  DD   DISP=SHR,DSN=millen.loadlib
//SYSLIN   DD   *
INCLUDE CPMILL(X3XBIO)
NAME X3XBIO(R)
/*
```

where:

`millen`	Is the high-level qualifier for your Millennium production datasets.
`objlib`	Is the Millennium object module library.
`genlib`	Is the Millennium subprogram load library.
`loadlib`	Is the Millennium load module library.

E.5 Run-time Requirements

The Interface now resides on your system. Before you invoke the Interface, you must:

- Create a program (a CLIST or REXX EXEC for TSO, a FOCEXEC for MSO, or JCL for a batch environment) that invokes FOCUS, with the Interface, as described in Chapter 3, *Getting Started*.
- Create Master Files and, optionally, Access Files for all Millennium DBID files users will access, as described in Chapter 2, *Creating FOCUS Descriptions.*

E.5.1 MSO Considerations

The MSO server must allocate all Millennium control and database ddnames globally because Millennium software is unaware of any MSO ddname translations that are in effect. Consult the *FOCUS for IBM Mainframe Multi-Session Option Installation and Technical Reference Guide* for complete instructions.

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